Armed Forces College of Medicine

AFCM

Brainstem I

Medulla

Prof. Dr. Shahera Yussef

Ass. Prof. Asmaa Abd Elmonem

INTENDED LEARNING OBJECTIVES (ILO)

By the end of this lecture the student will be able to:

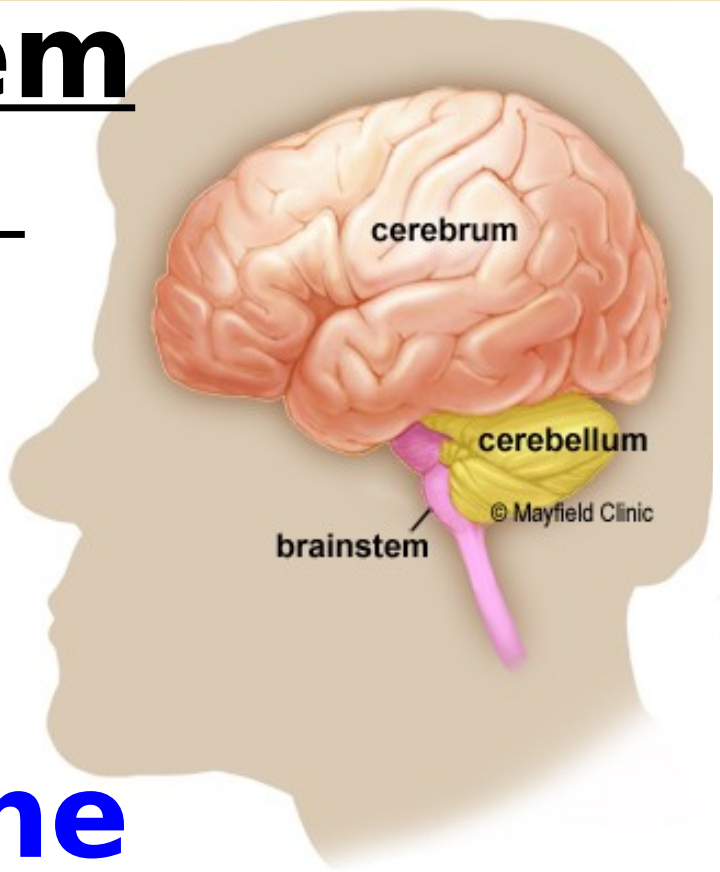
1. **Describe gross morphology of ventral and dorsal aspects of MEDULLA OBLONGATA**
2. **Describe the internal structure and correlated functions of the different levels of medulla.**
3. **Describe superficial attachments of cranial nerves.**
4. **Describe blood supply of medulla .**
5. **Correlate the vascular distribution with the**

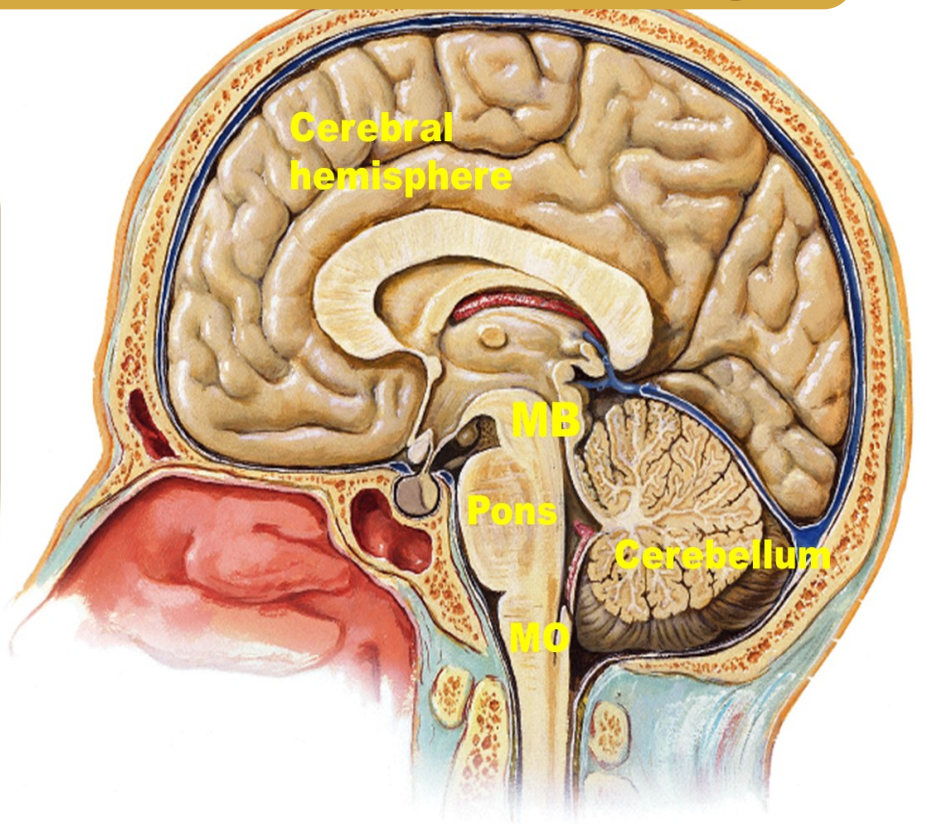
BRAIN STEM

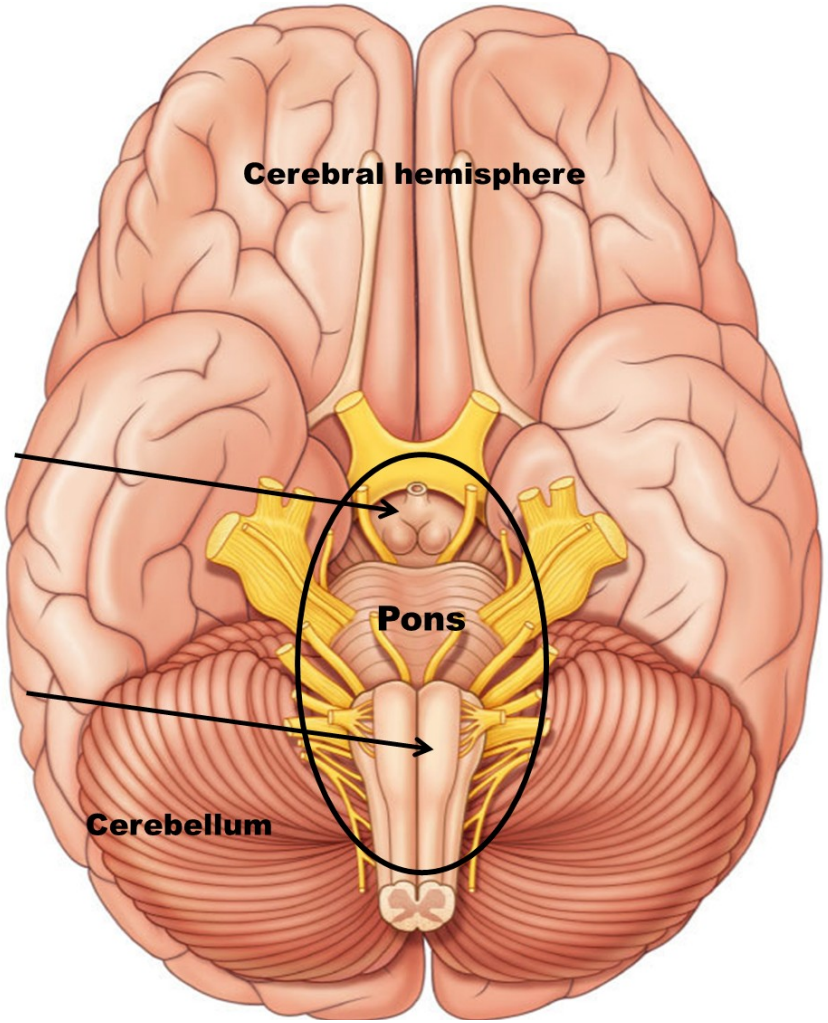
The brain stem is formed of:

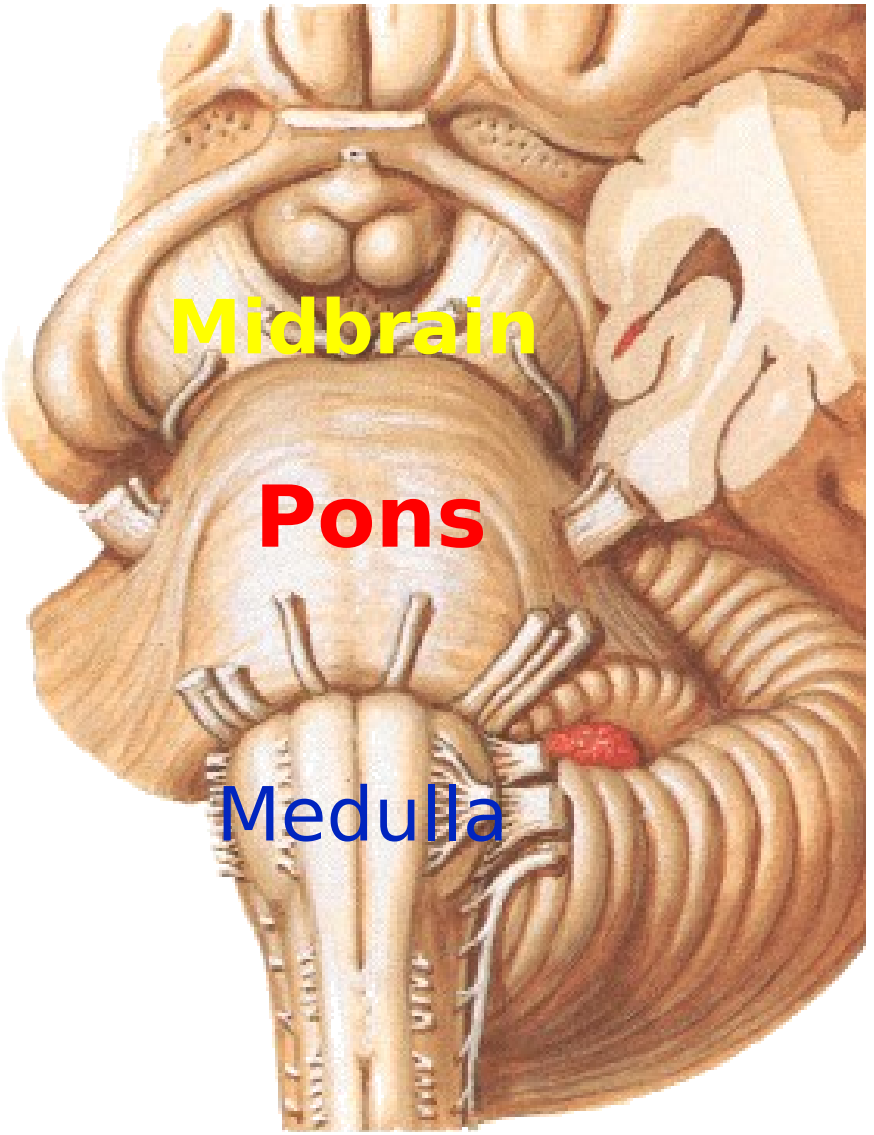
I. midbrain
II.Pons
III.medulla oblongata.

It connects the Cerebral Hemispheres with the



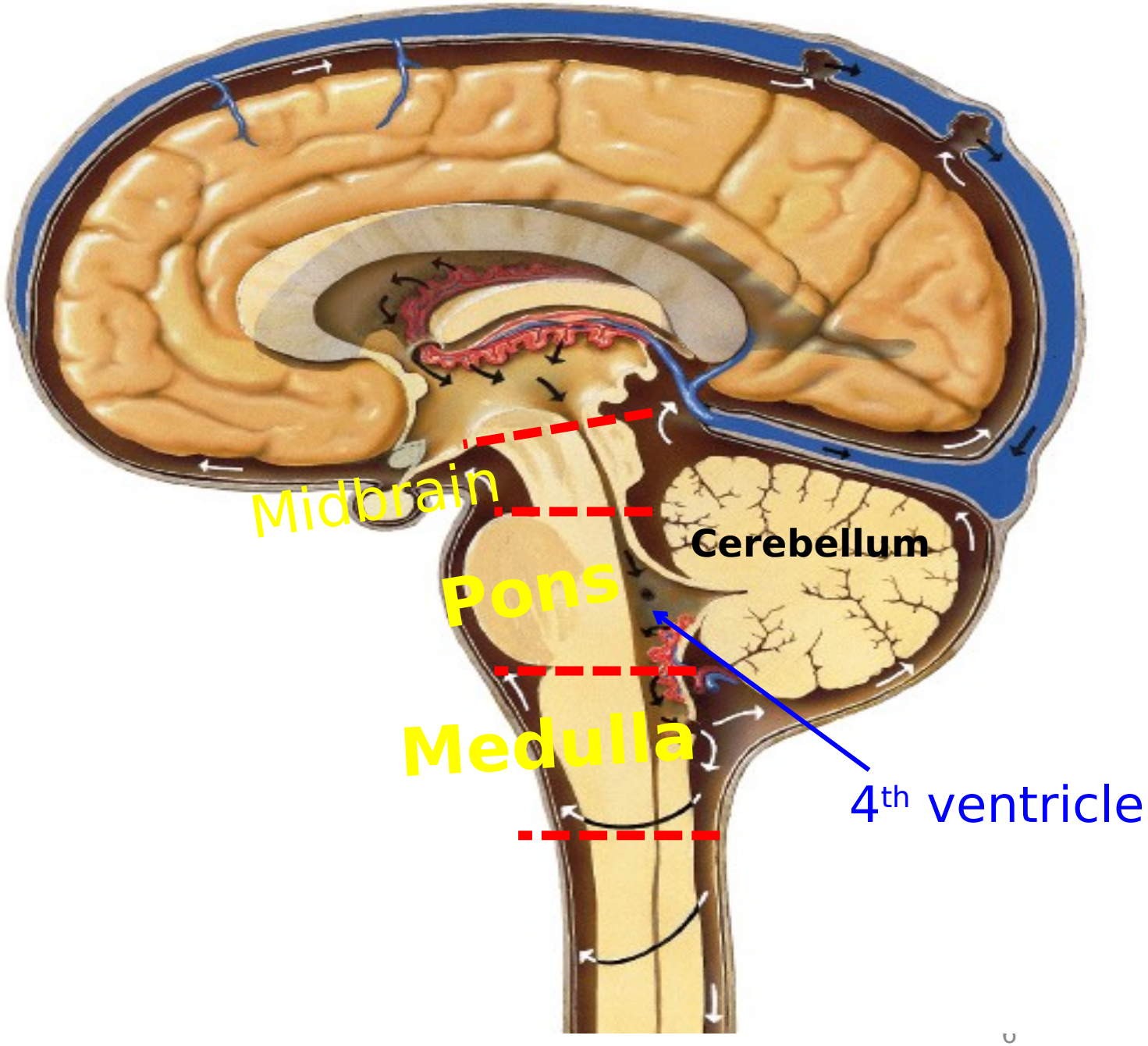



Cerebral hemisphere
Pons
Cerebellum


Midbrain
Pons
Medulla

Medulla oblongat

EXTENSION:
from the lower border of the foramen magnum below
to the lower border of the pons above

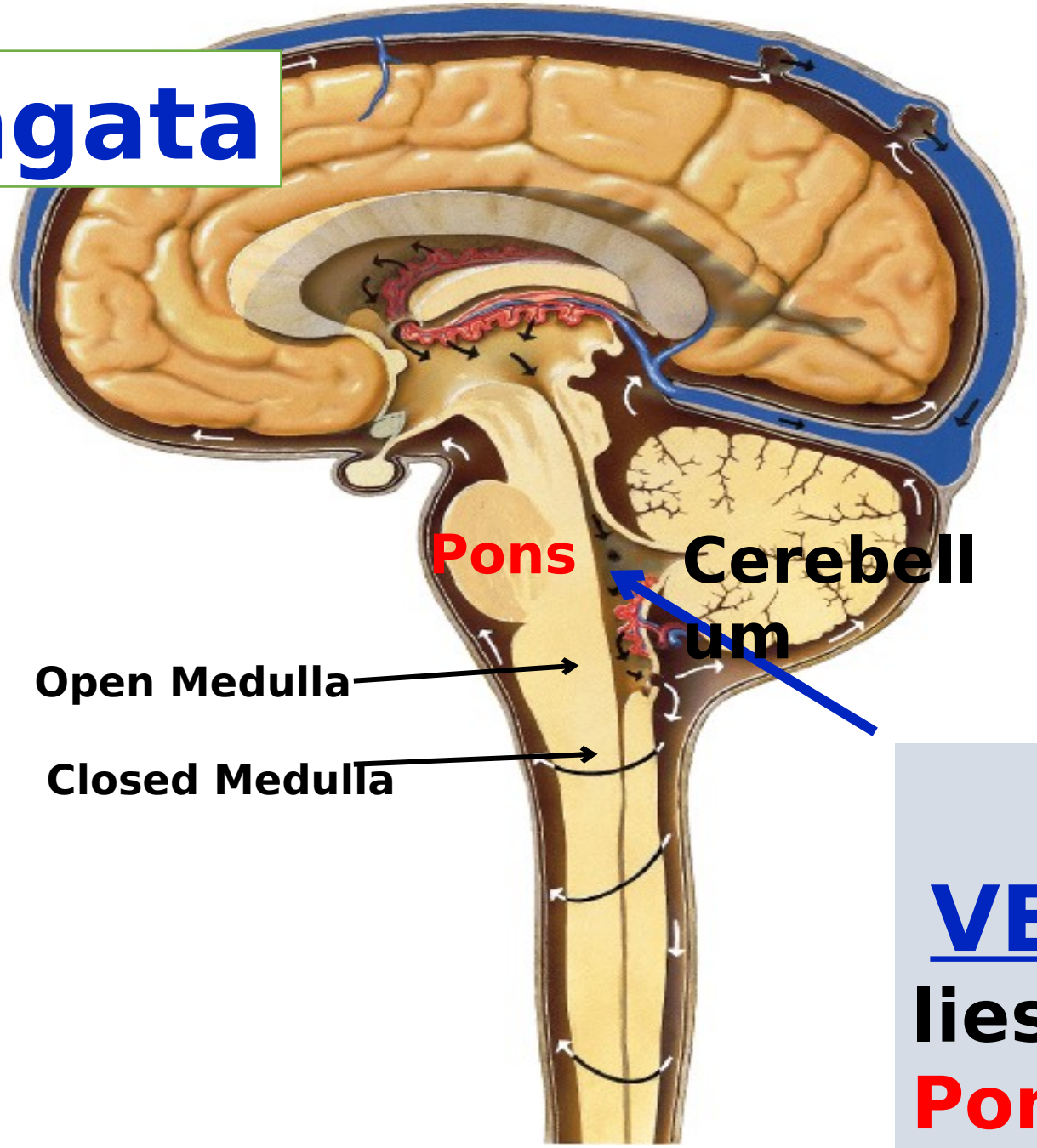


dulla oblongata

1) Open Medulla:

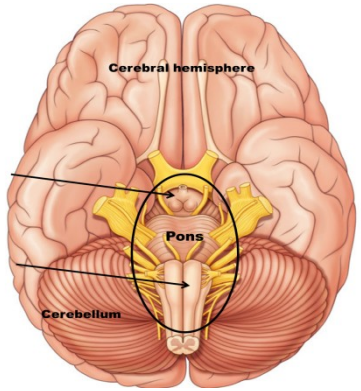
***Is the upper part.**

***Opposite the 4th ventricle (forms the lower part of its floor)**



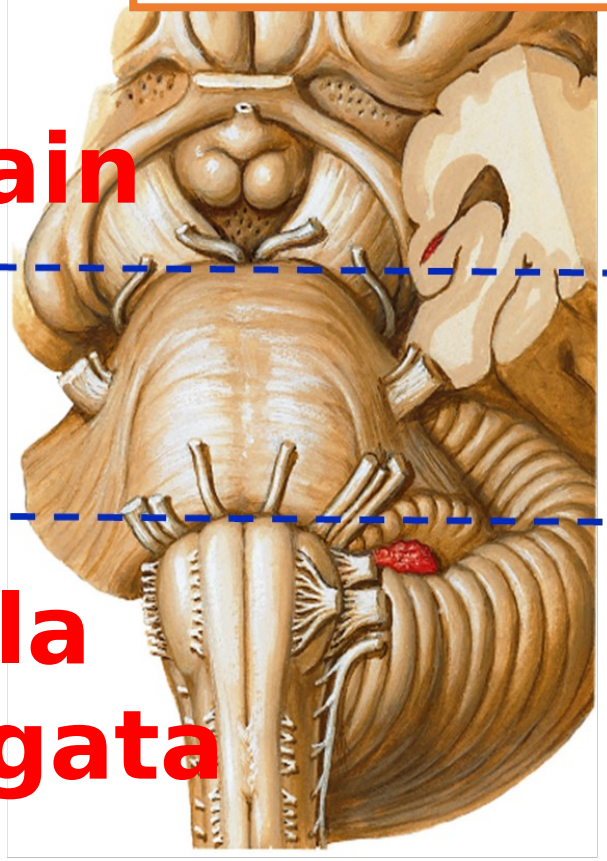
4TH VENTRICLE

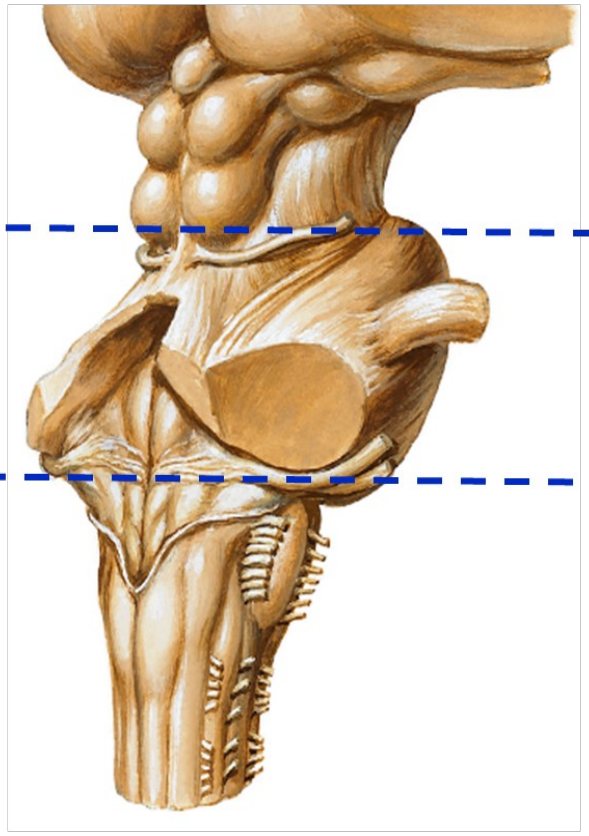
lies inbetween Pons &

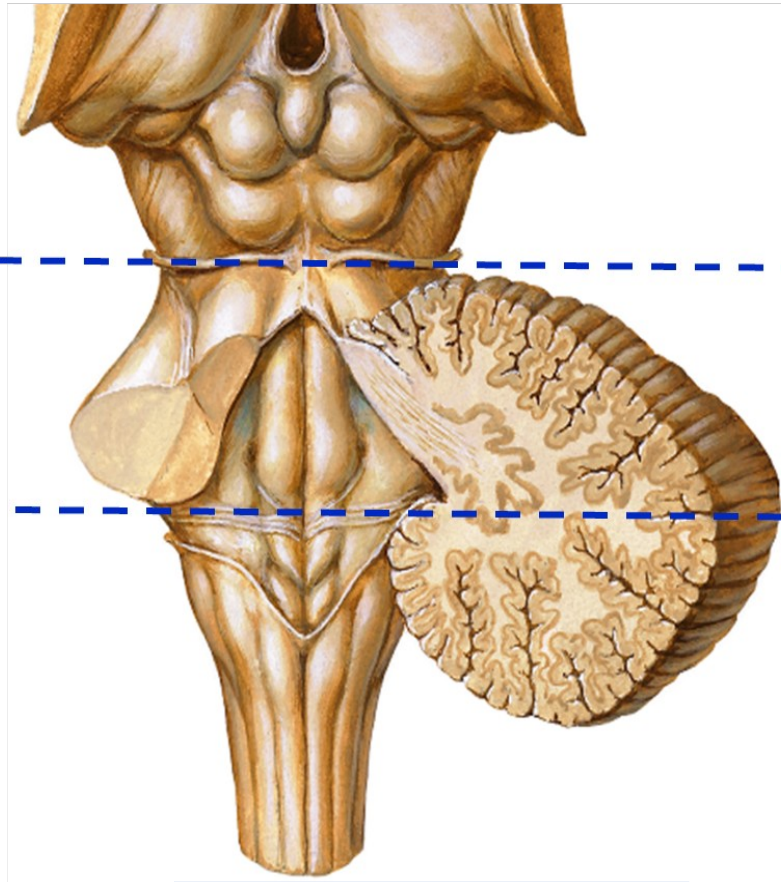


SURFACES OF BRAIN STEM

- Midbrain
- Pons
- Medulla Oblongata







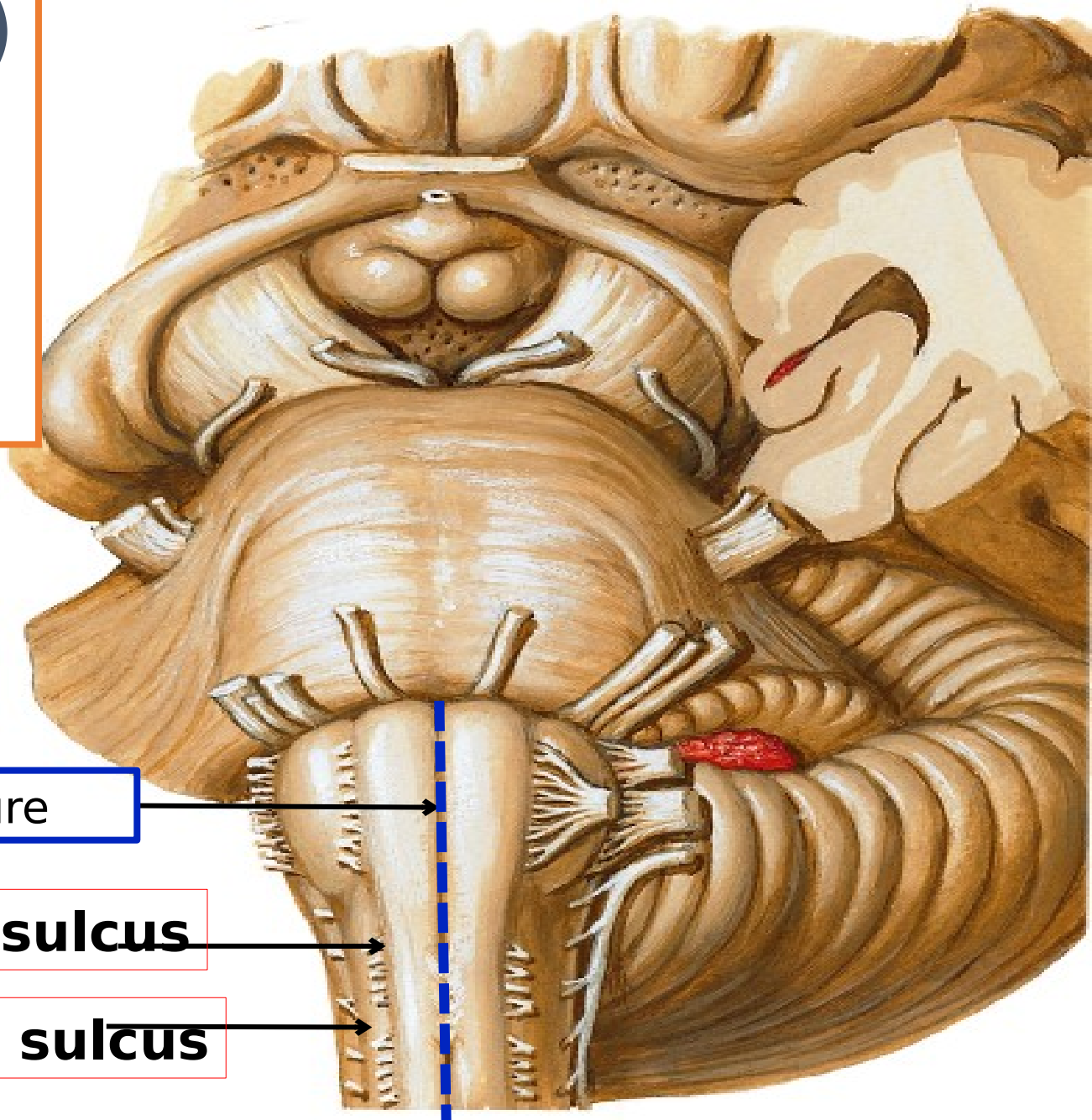
Anterior surface

Posterior surface

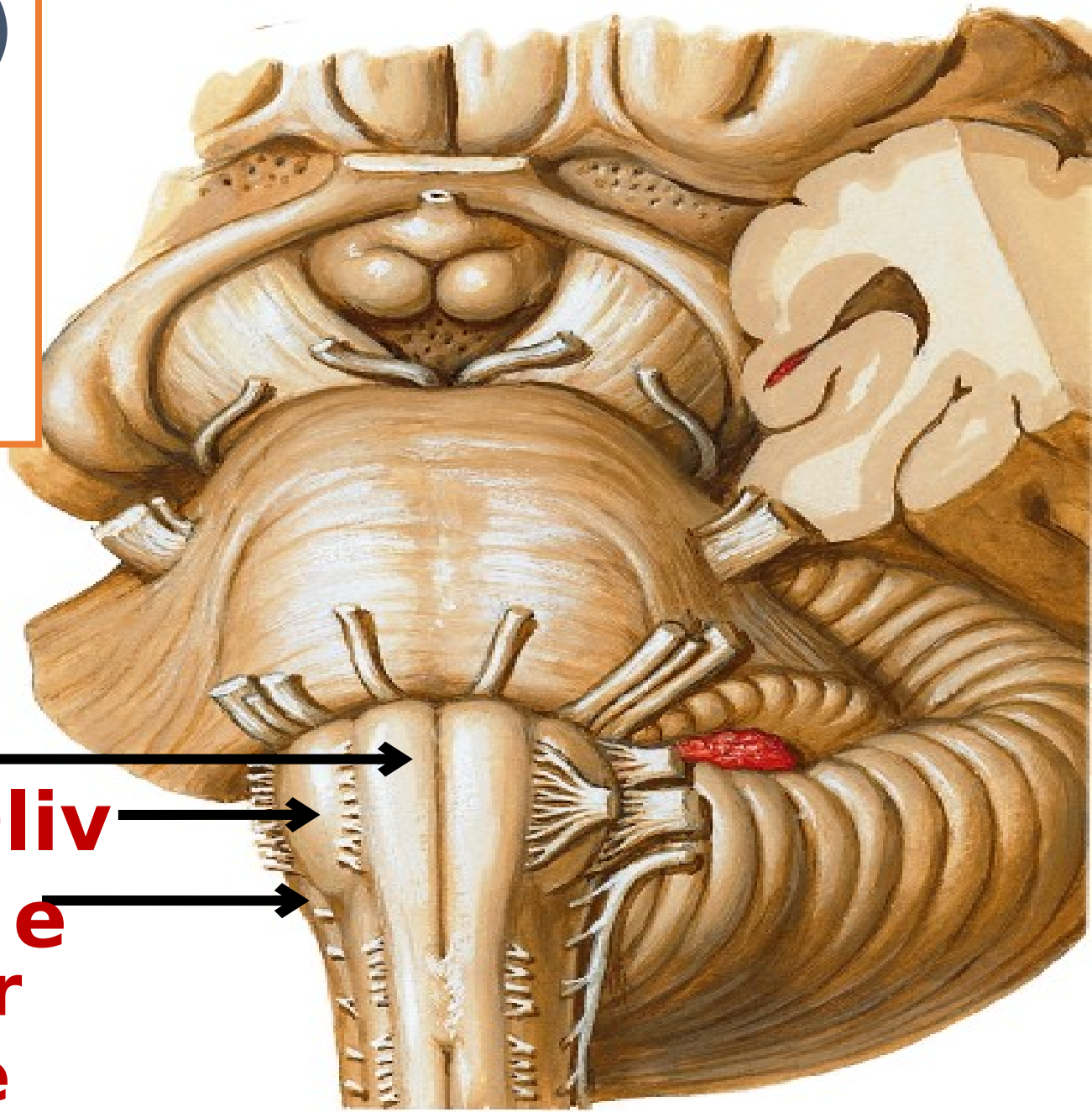
Ventral Surface of Medulla Oblongata

Ventral (Anterior) surface of Medulla Oblongata

Medulla Oblongata



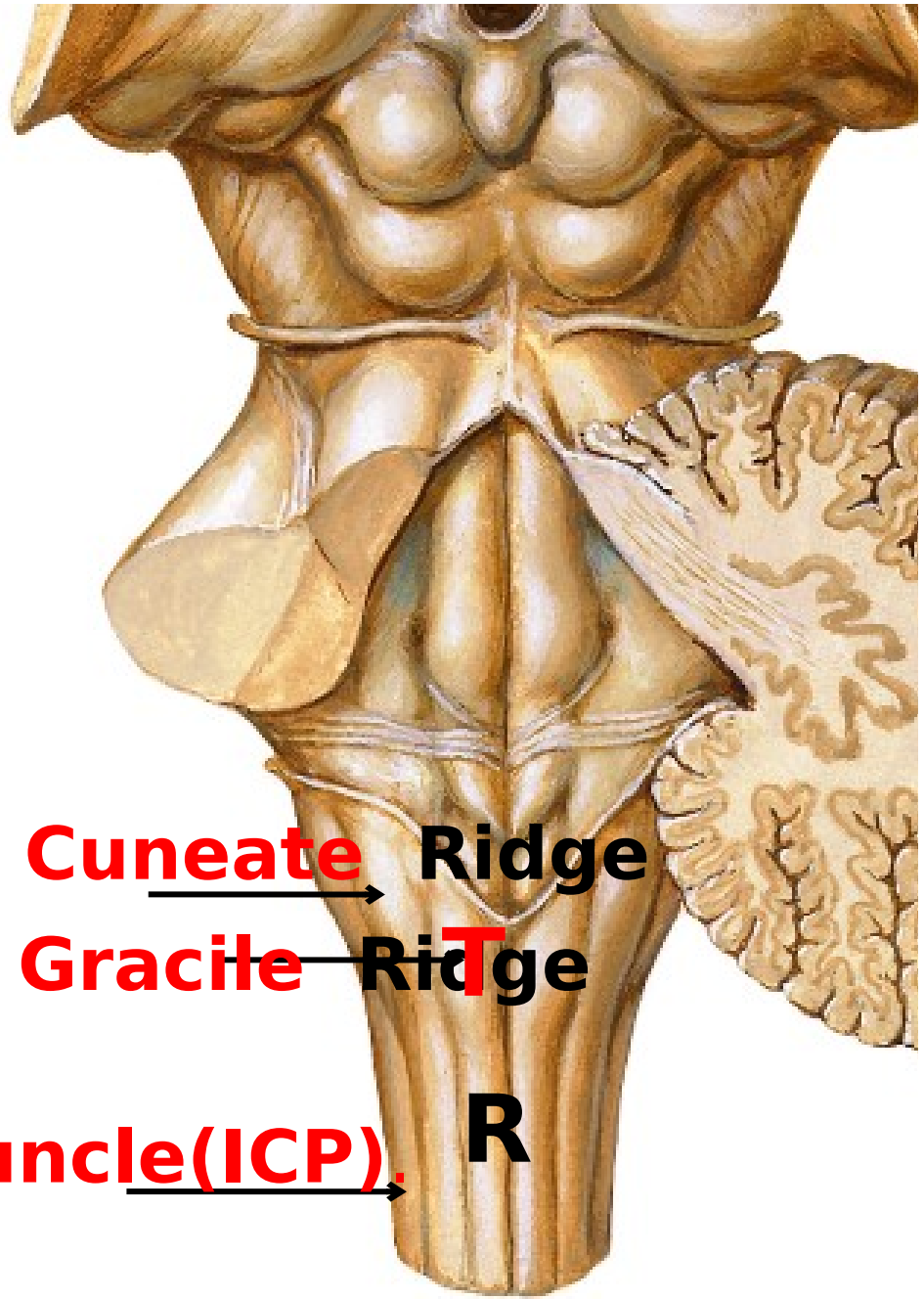
Ventral (Anterior) surface of Medulla Oblongata



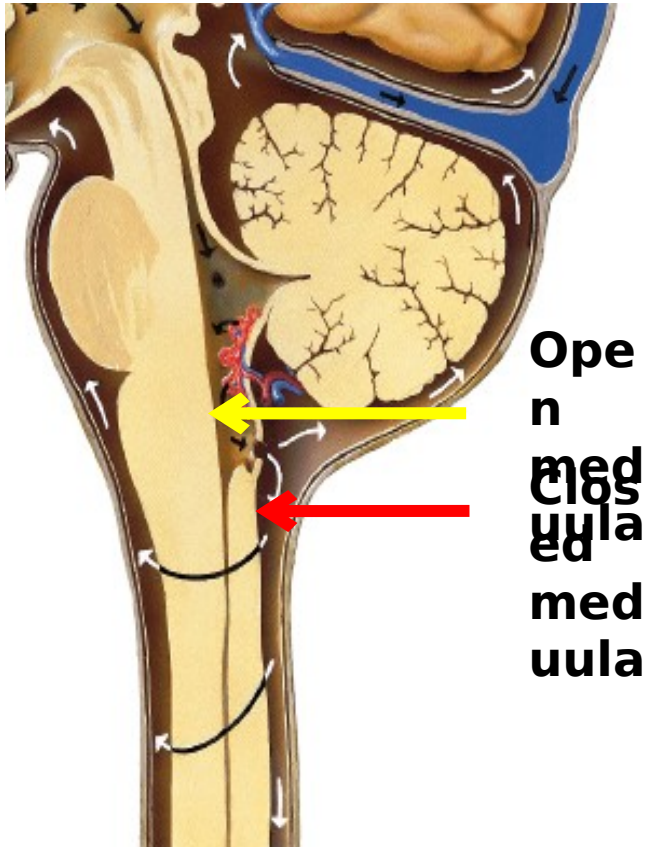
Medulla Oblongata

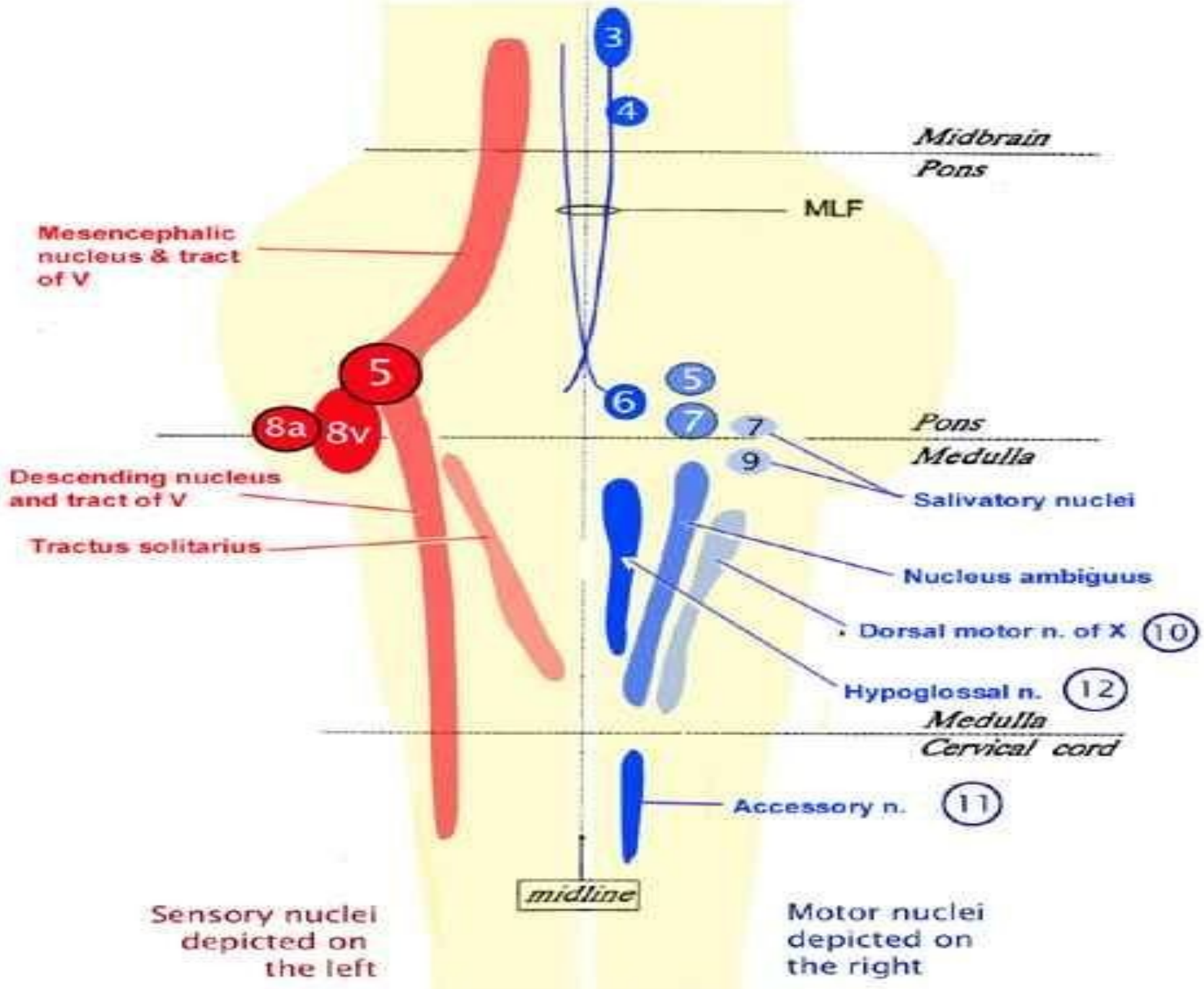
Posterior Surface of Medulla Oblongata

Posterior Surface of Medulla Oblongata



A-closed medulla:





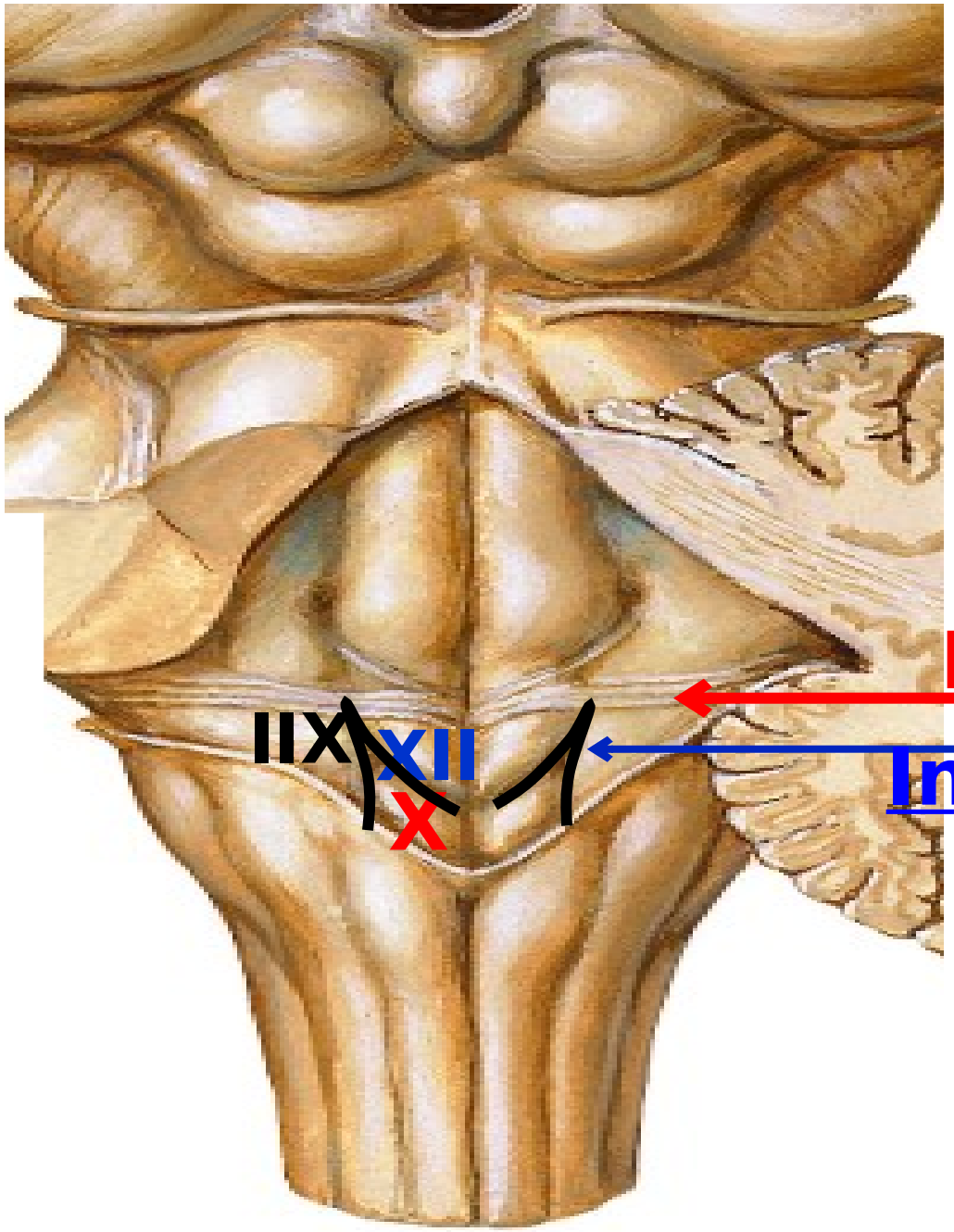
Brainstem Cranial Nerve Nuclei

Posterior Surface of Medulla Oblongata

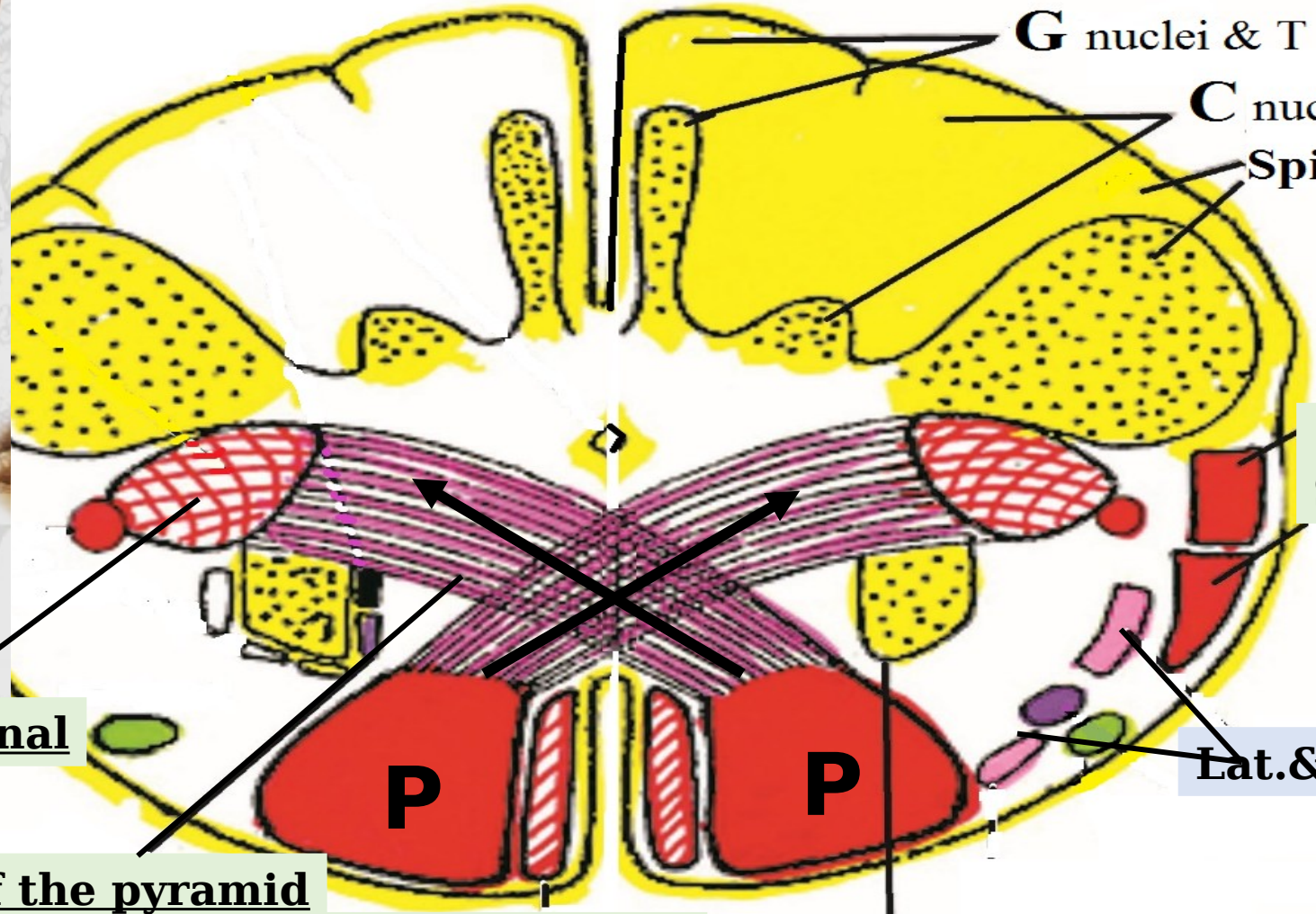
- **medullary stria (horizontal fibers)**
- **Depressed sulcus : Inferior fovea**

an inverted V-shaped depression.

- **3 areas = trigone :**



1-Closed Medulla (Motor #)



Dors & Ven. Spino-cerebellar

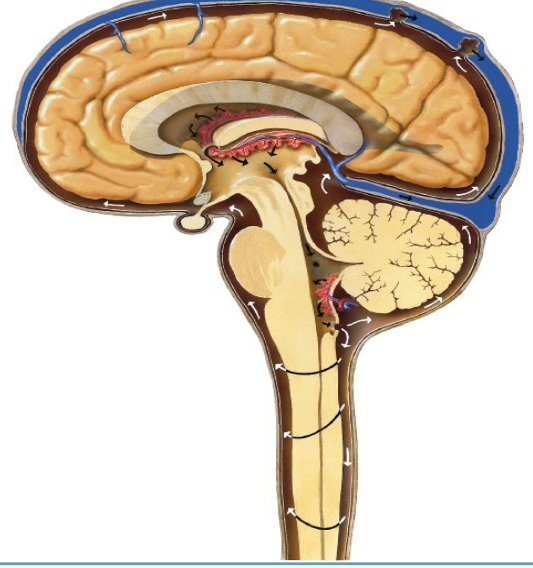
Lat. corticospinal

Lat.&vent.spinothalamic

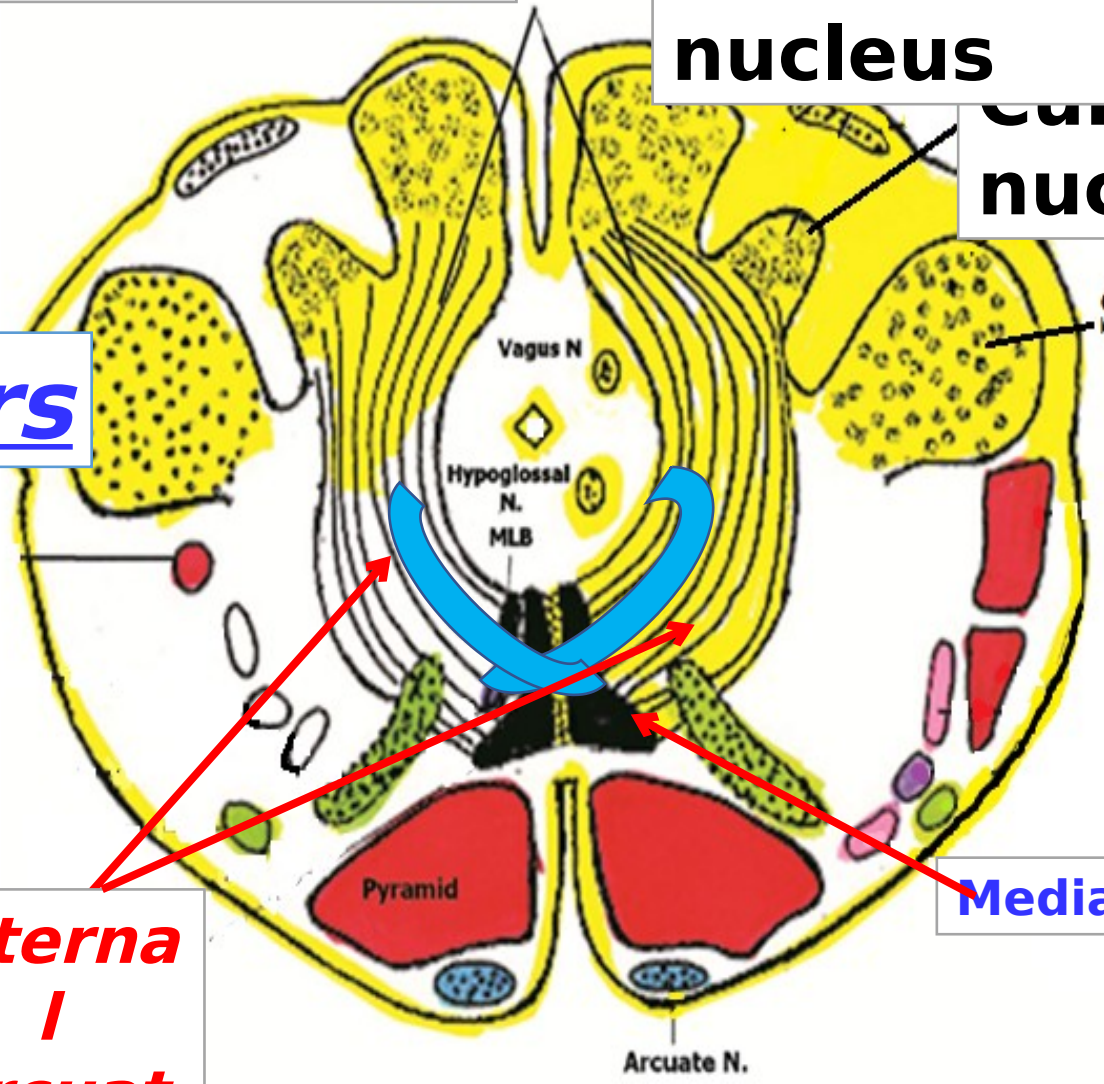
Decussation of the pyramid

Ant. corticospinal

Detached A.H. cells



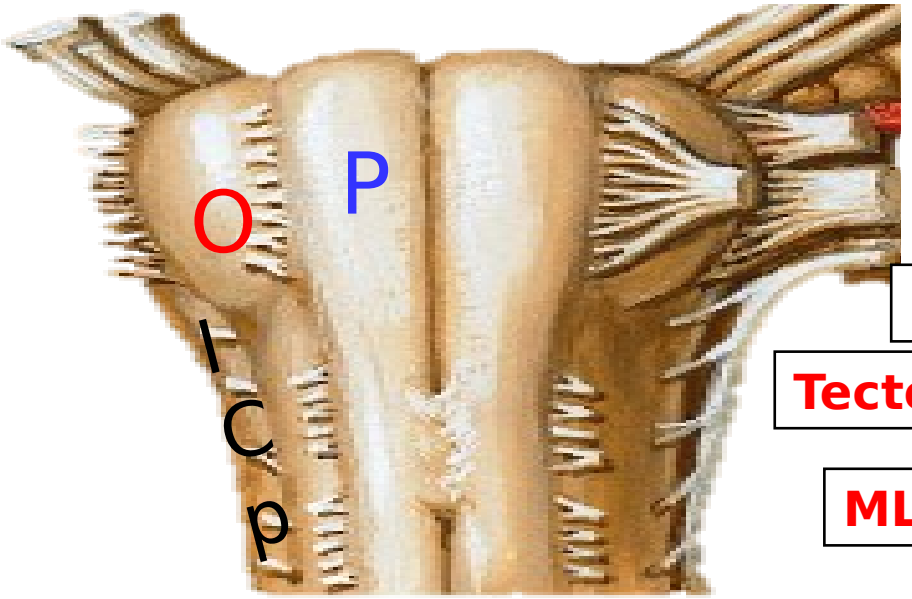
2-Closed Medulla (Sensory #)



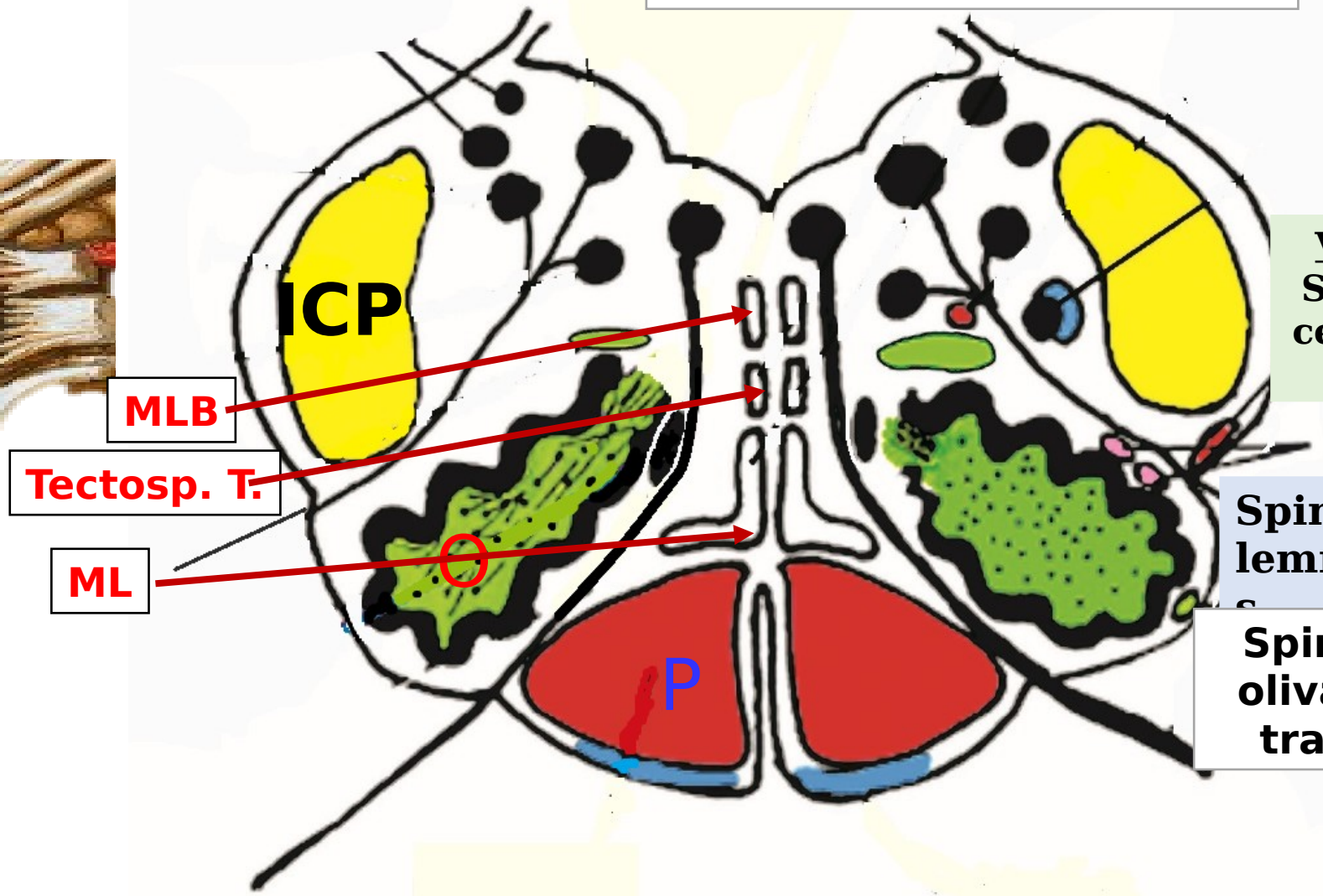
Internal arcuate fibers

- ***Axons of gracile and cuneate nuclei curve anteriorly forming internal arcuate fibers***
- ***Decussate with the fibers of the opposite side***
- ***After decussation fibers***

3-Open Medulla (ventral surface)



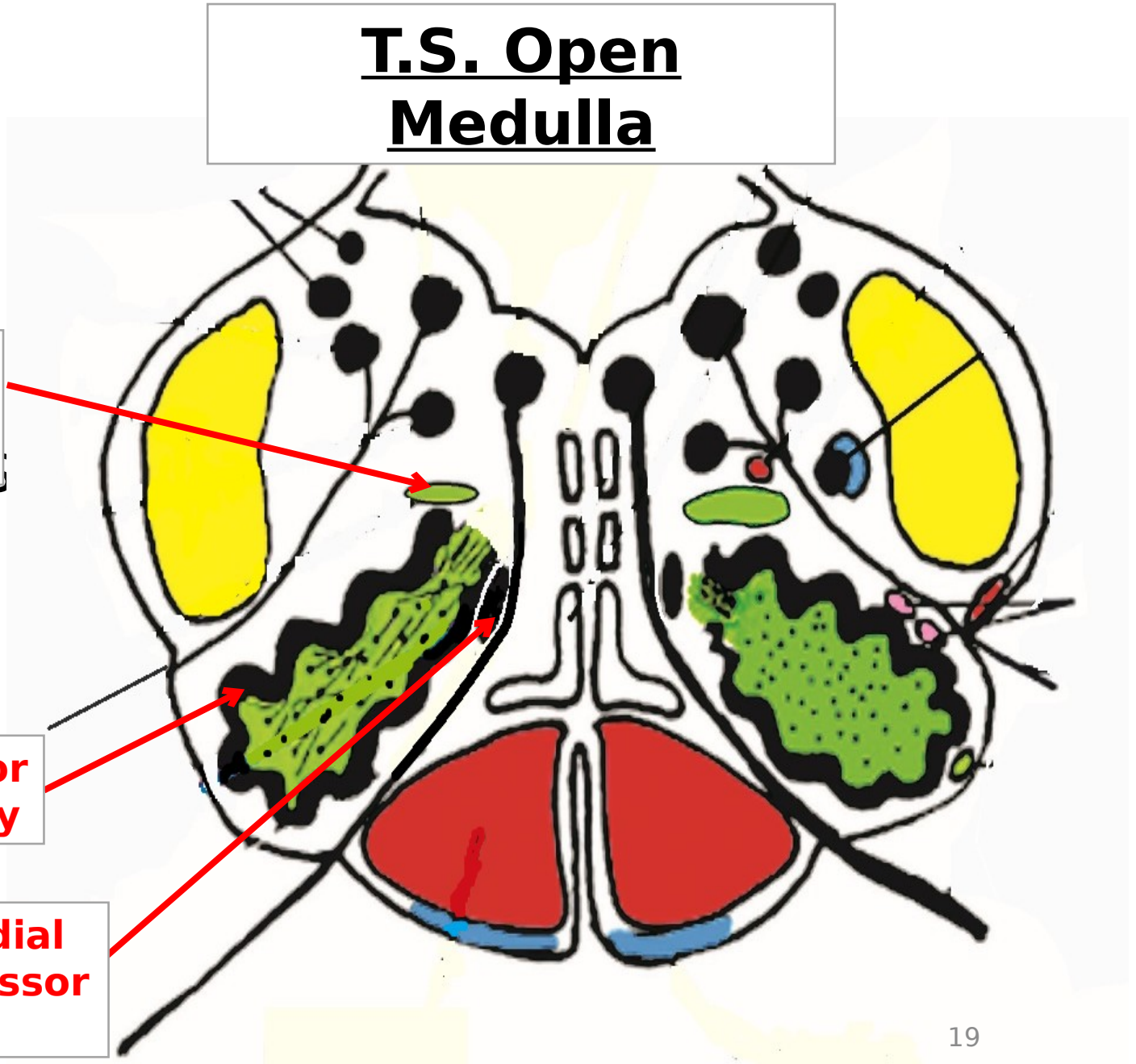
Transverse section



❑ Olivary complex

OLIVARY NUCLEI (3 in number)

1. **Inferior** Olivary nucleus
2. **Dorsal Accessory** Olivary nucleus
3. **Medial Accessory** Olivary nucleus



❑ Olivary complex

➡ ***Unconscious proprioception to cerebellum***

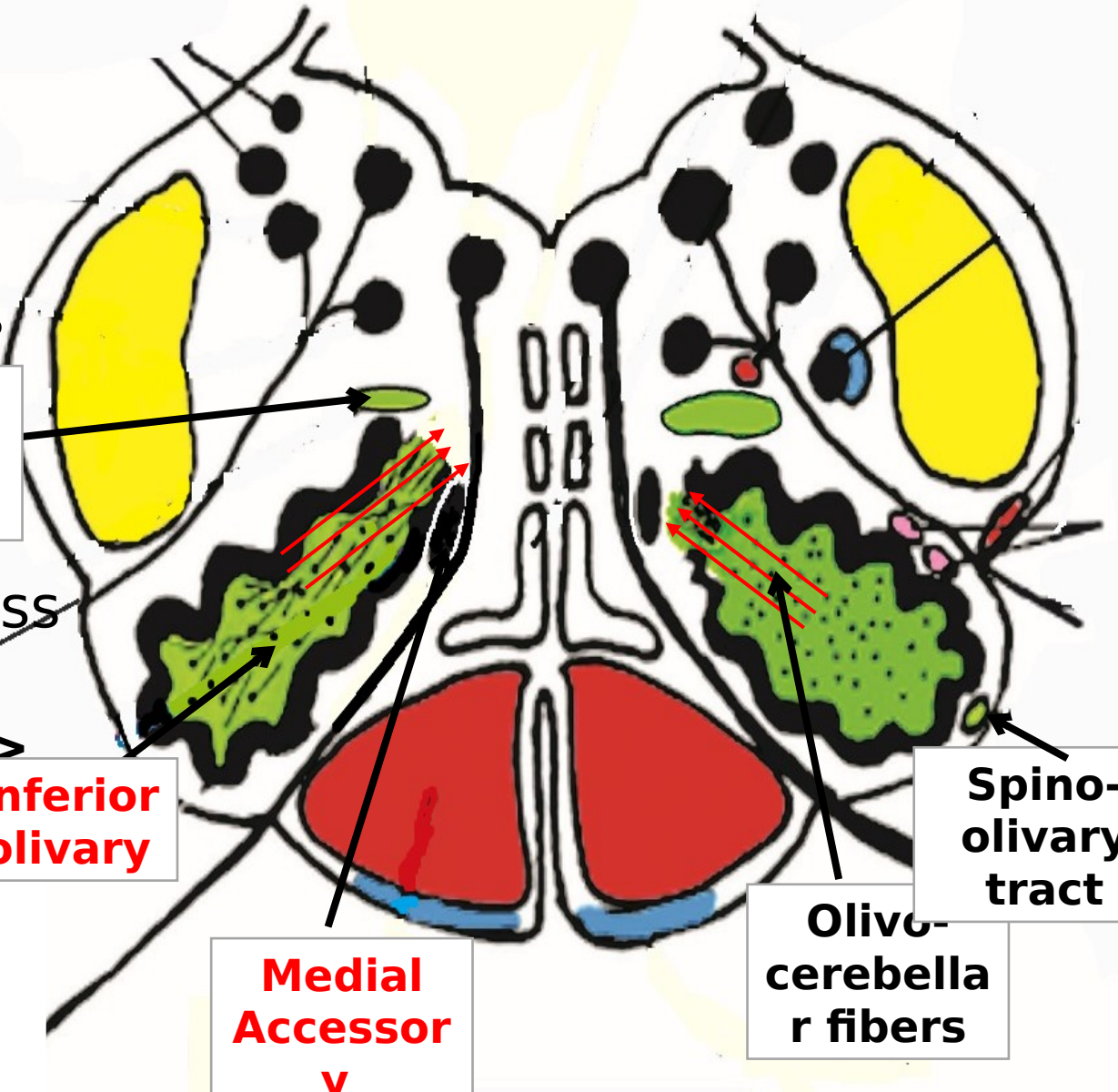
➢ ***Inferior olive:***

It is the largest, lies in the open medulla & appears corrugated with its hilus facing dorso-medially.

_ Function:

- Receive ***Spino-olivary tract***
- Sends ***olivo-cerebellar fibers*** (cross & pass via the ICP).

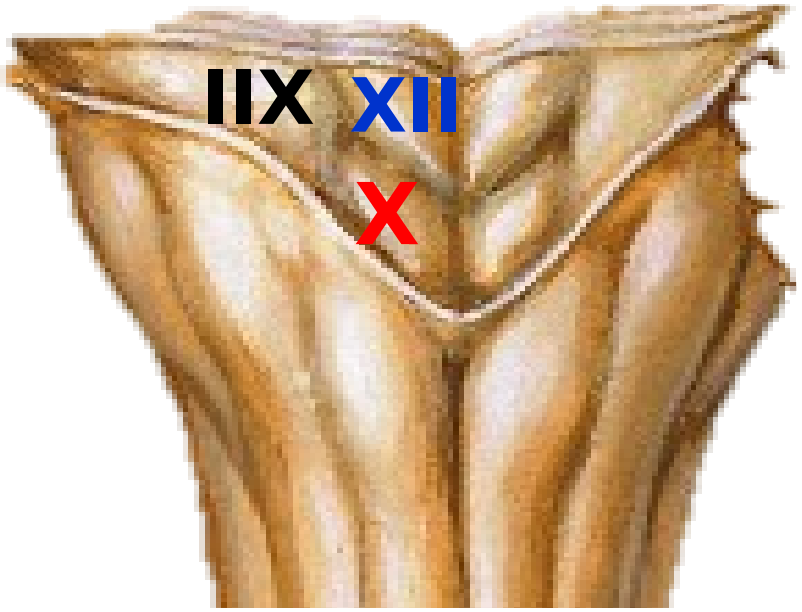
Spinal cord ----->inferior olive ---->

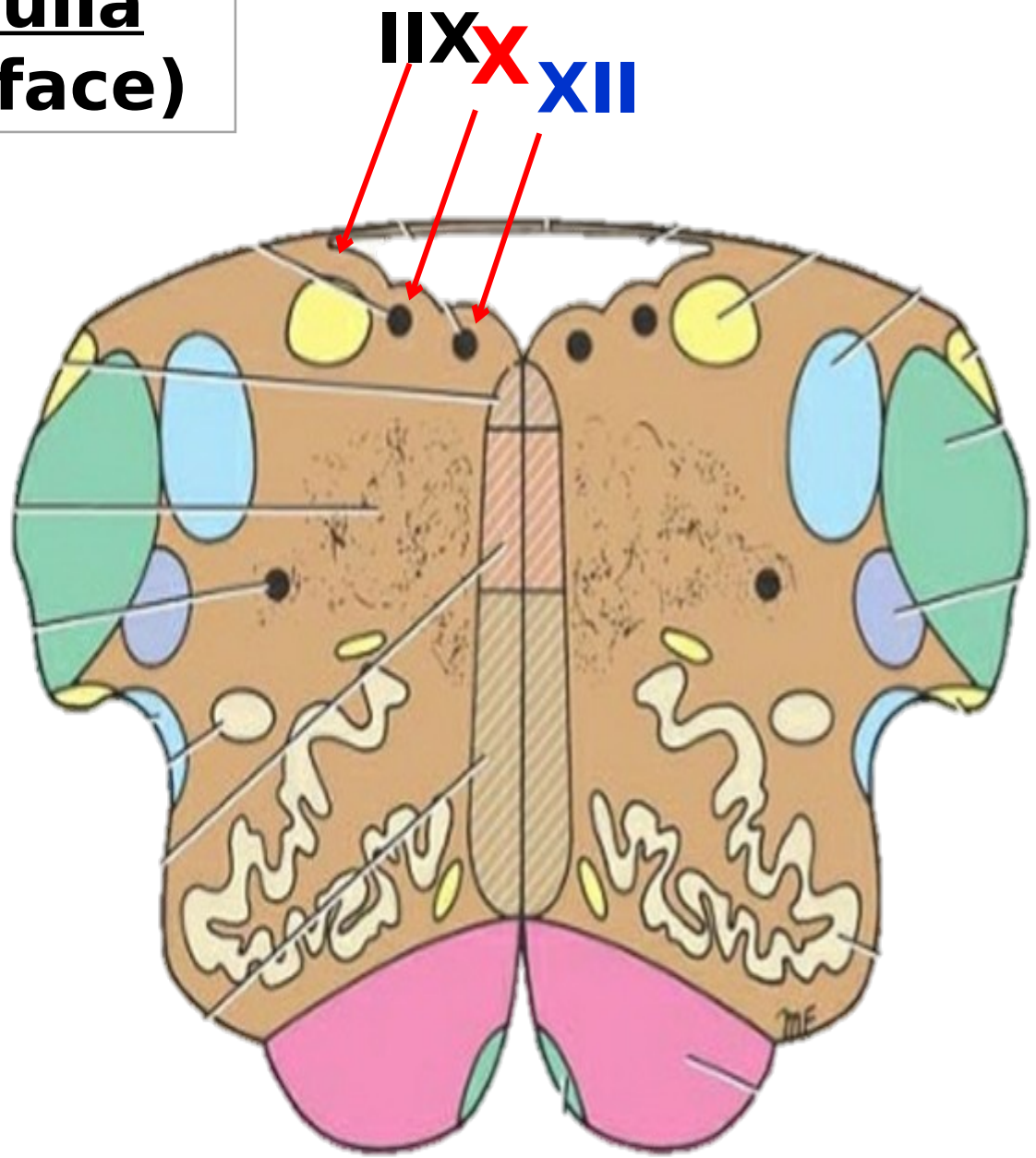


➢ ***Dorsal & medial accessory olives:***

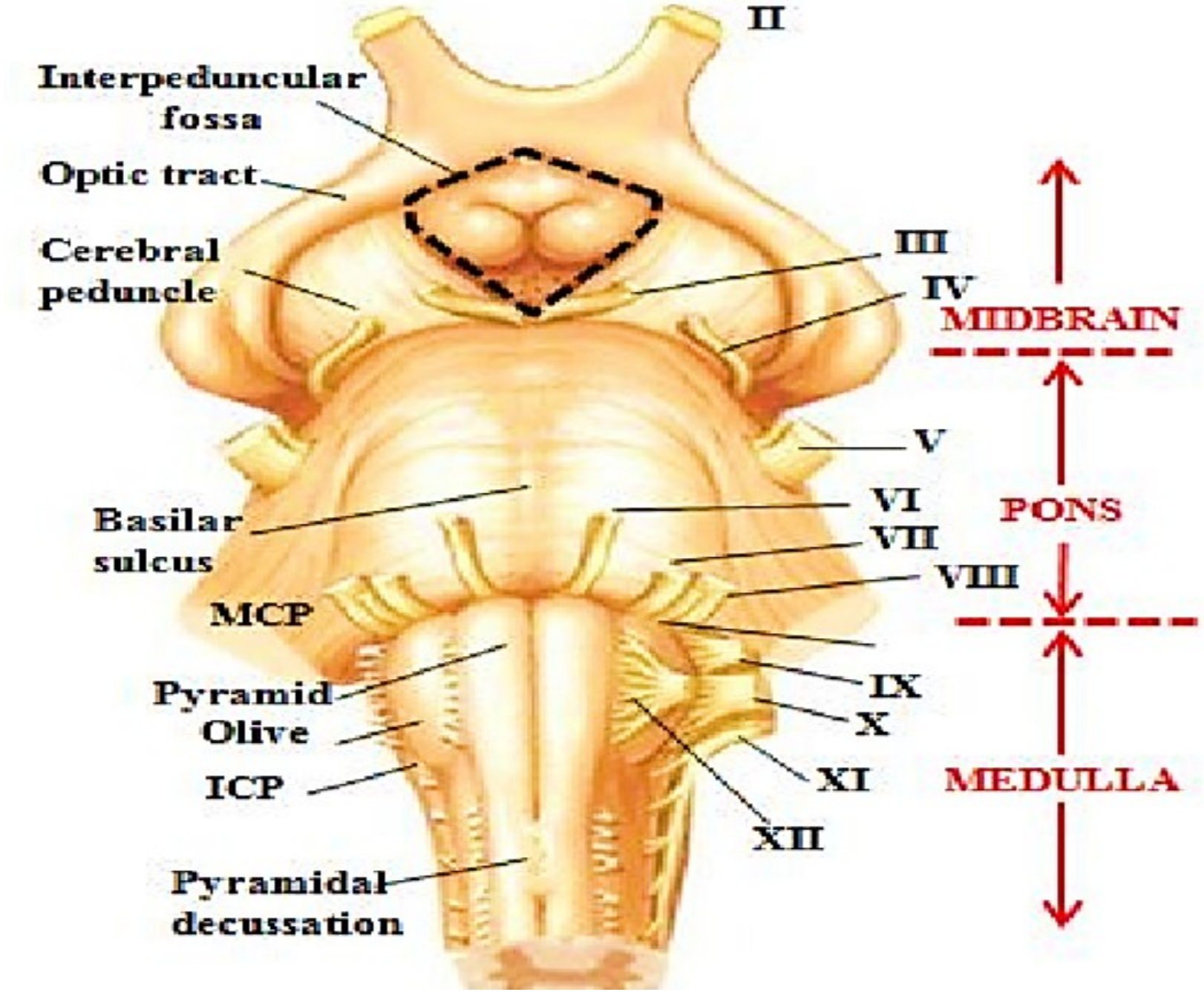
Send proprioceptive fibers to cerebellum

Open Medulla (Dorsal surface)





1. **Hypoglossal Trigone: overlies hypoglossal nucleus.**
2. **Vagal Trigone: overlies dorsal vagal nucleus**

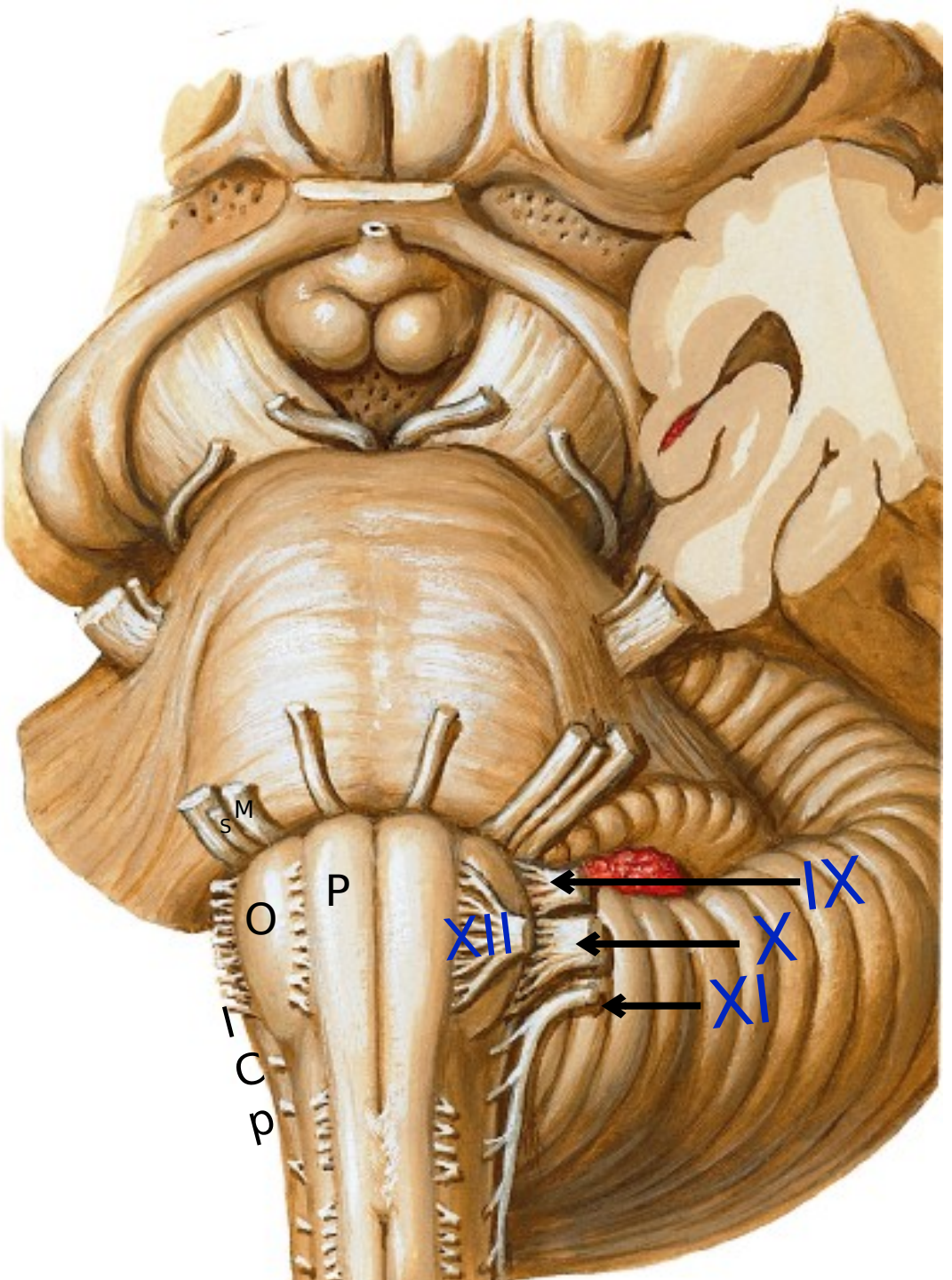

II
Interpeduncular fossa
Optic tract
Cerebral peduncle
III
IV
MIDBRAIN
V
VI
VII
VIII
PONS
Basilar sulcus
MCP
IX
X
XI
XII
MEDULLA
Pyramid
Olive
ICP
Pyramidal decussation

- **Glossopharyngeal (9th)**
- **Vagus (10th)**
- **Acessesory (11th) nerves**

exit between olive and ICP

- **Hypoglossal (12 th) nerve**

exit between pyramid and olive



Cranial nerves nuclei at the level of open medulla

1-Dorsal vagal nucleus (parasympathetic) = X CN nuclei

2-Nucleus solitarius

It receives taste sensation from cranial nerves

3-Nucleus ambiguus

It gives motor fibers to IX, X, XI (ms of pharynx, larynx, palate)

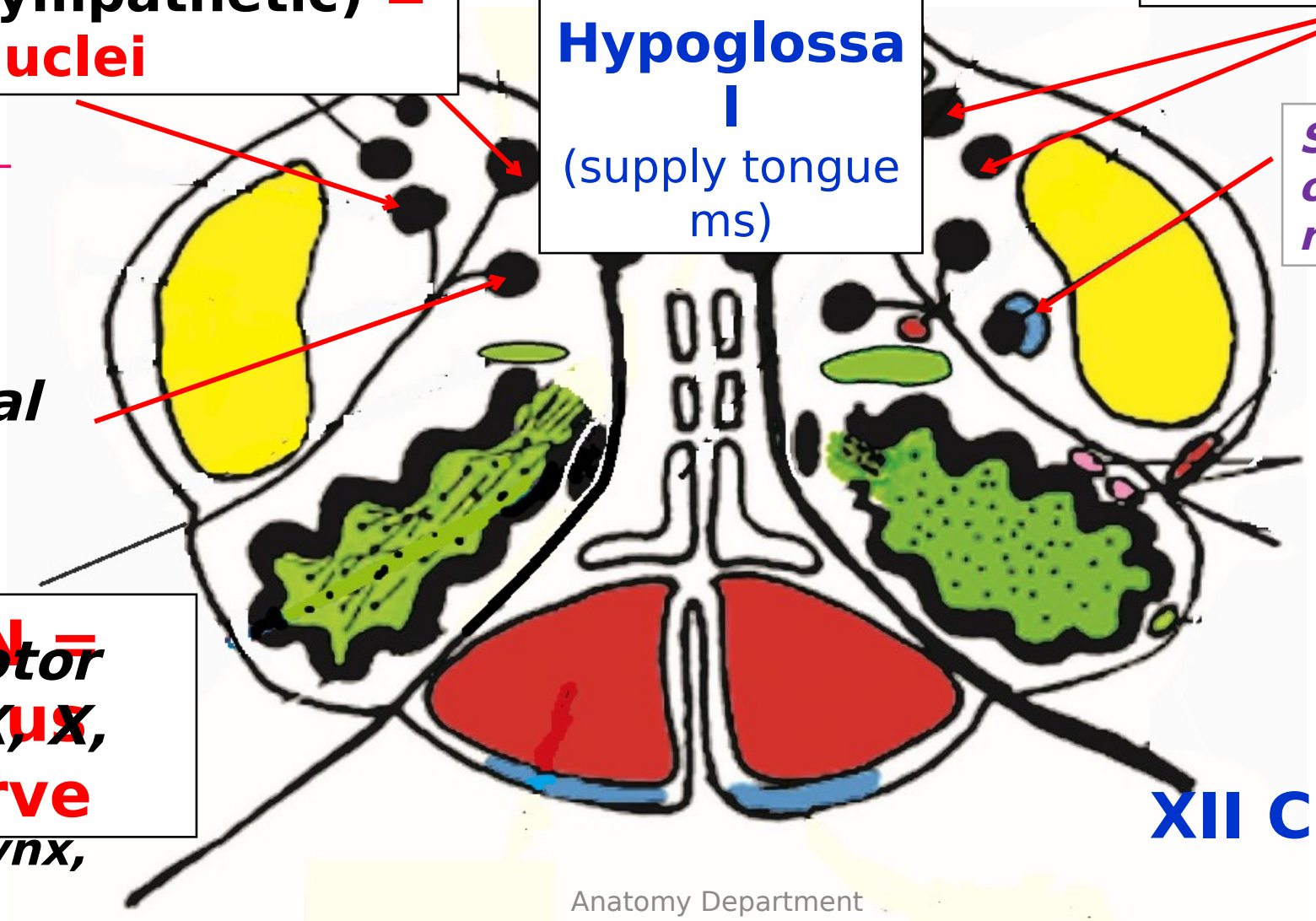
X CN = Vagus nerve

XII CN nuclei Hypoglossal

(supply tongue ms)

Vestibular Nuclei =VIII CN

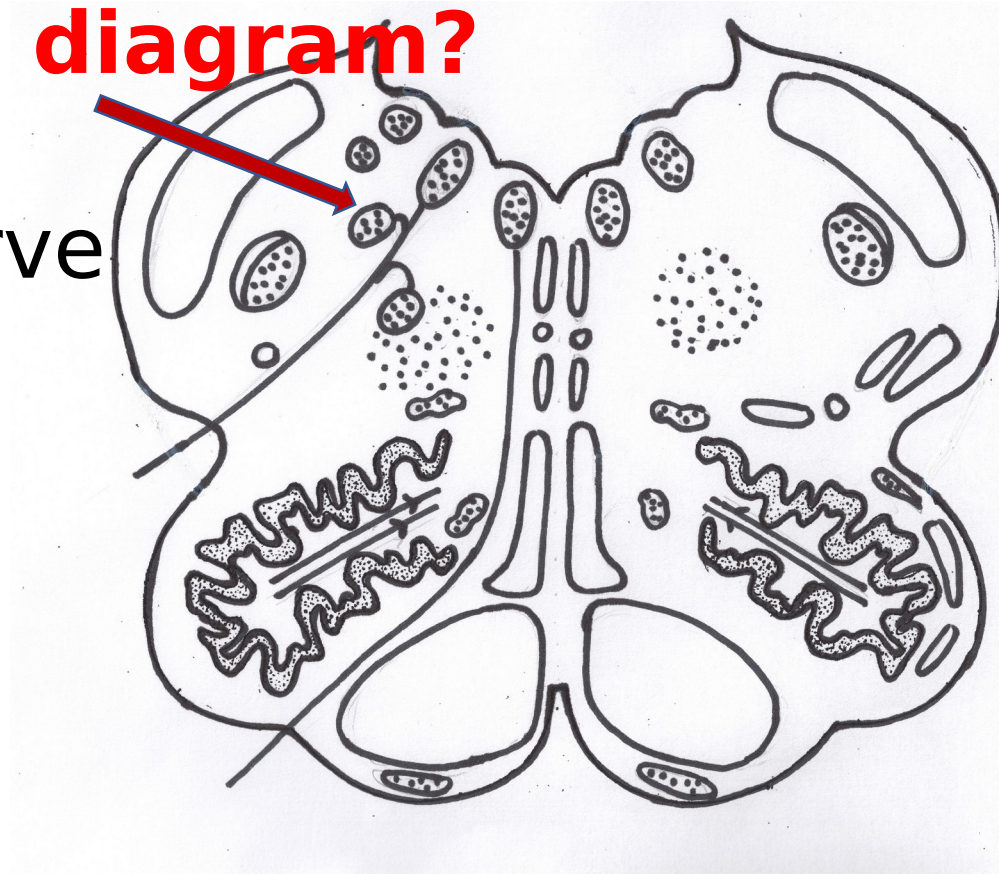
Spinal nucleus of trigeminal nerve



XII CN

Lecture Quiz

- **Which of the following structure is indicated by the arrow in the provided diagram?**



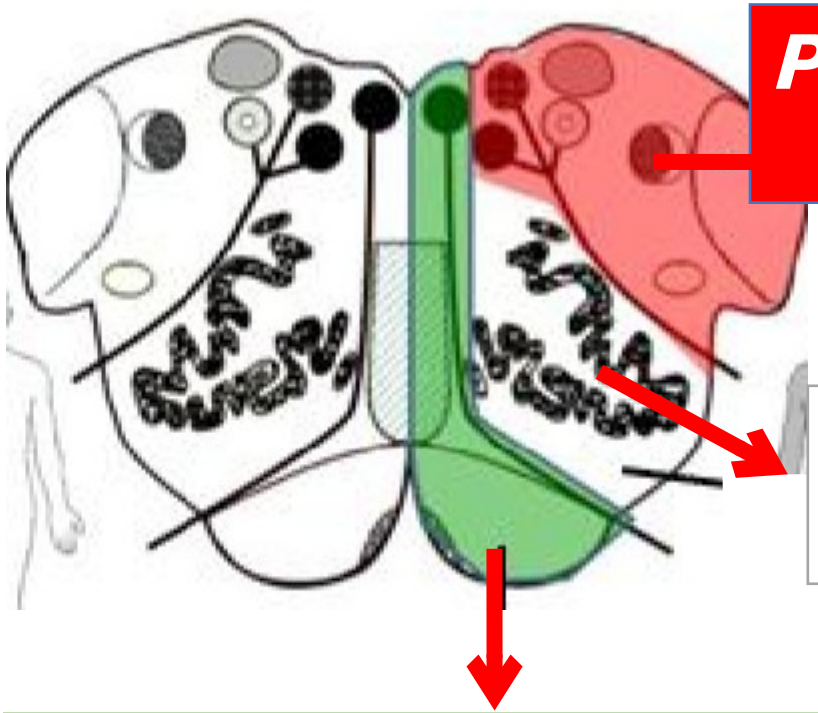
1. Spinal nucleus of trigeminal nerve
2. Hypoglossal nucleus
3. Dorsal motor nucleus of vagus
4. Medial vestibular nucleus
5. Nucleus solitaires

Lecture Quiz

- **Which of the following statement is correct concerning a transverse section through the superior level of medulla?**

1. The pyramids taper posteriorly and give rise to decussation of the pyramids.
2. The inferior olive receives corticospinal fibers.
3. The vagus nerve emerges between olive and inferior cerebellar peduncle.
4. Hypoglossal nucleus represents lateral trigon in the floor of 4^{th} ventricle.
5. The medial lemniscus is formed by the lateral spinothalamic and spinotectal tracts.

Blood supply of the medulla



Posterior inferior cerebellar ar (PICA):

supplies **lateral part** of MO.

Medullary branches of vertebral artery

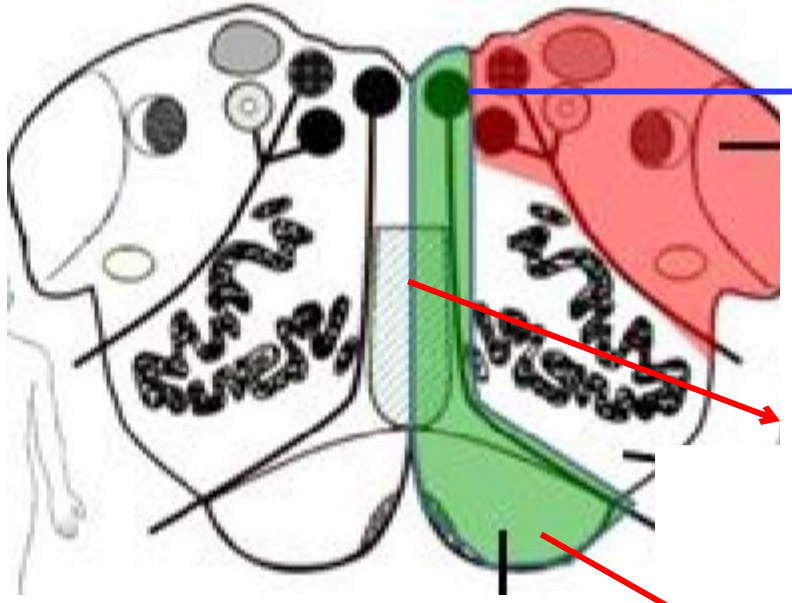
olive).

Anterior spinal artery

supplies the part **medial to hypoglossal nerve** (containing XII nucleus, medial lemniscus& pyramid).

Anterior spinal artery occlusion

Medial medullary syndrome

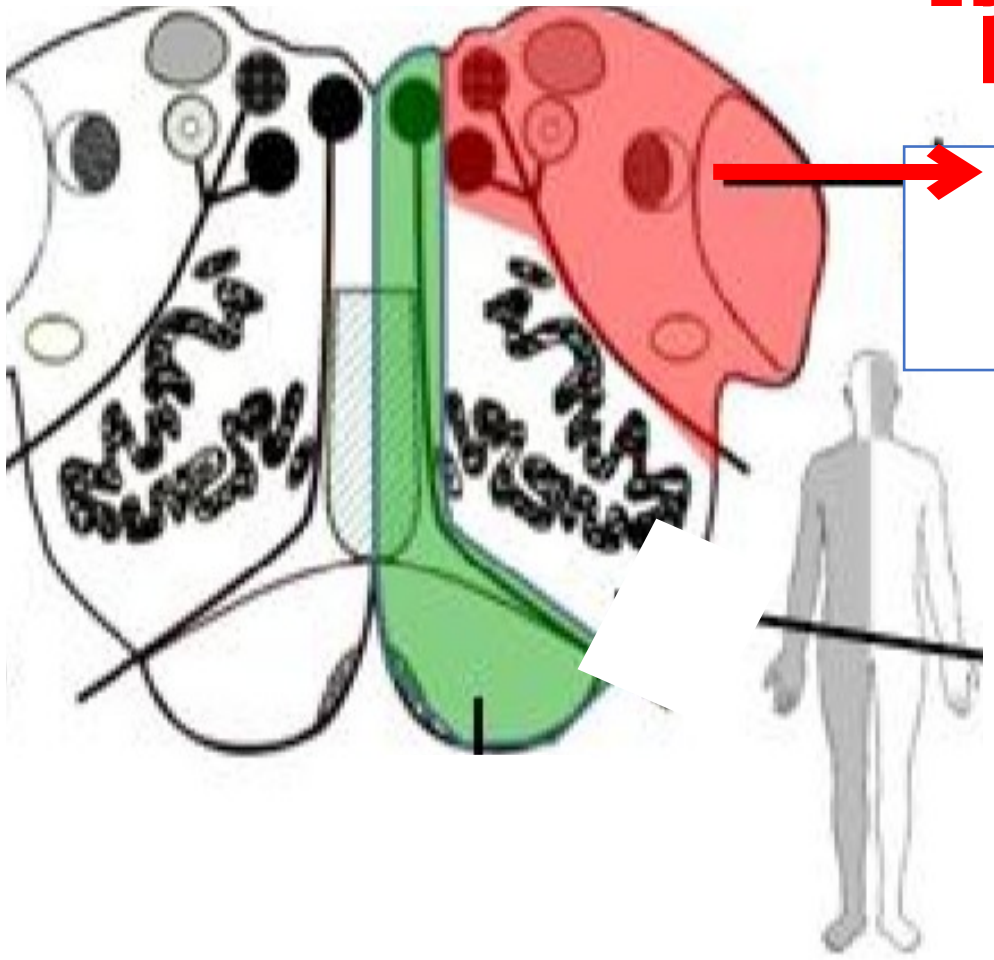


XII nucleus → ipsilateral LMNL paralysis of tongue muscles

Medial lemniscus → contralateral loss of proprioception & fine touch

Pyramid → contralateral hemiplegia

PICA occlusion



lateral medullary syndrome

cerebellar ataxia.

b. Spinal Nucleus of V ipsilateral loss of pain & temp. from face.
c. Spinal lemniscus contralateral loss of pain & temp. from body.
d. Nucleus ambiguus ipsilateral paralysis of palate, pharynx, larynx.
e. Nucleus solitarius loss of taste sensation.

Lecture Quiz

- **Lateral medullary syndrome affects which of the following internal structure of the medulla?**

1.The pyramids.
2.The inferior olive.
3.Inferior cerebellar peduncle.
4.Medial lemniscus.
5.Hypoglossal nucleus.